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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/728,490

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Mark T. Anderson

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EXAMINER

CHACKO DAVIS, DABORAH

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

05/17/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/728,490	Applicant(s) ANDERSON ET AL.	
	Examiner DABORAH CHACKO DAVIS	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-35,37 and 38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-35,37 and 38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6, 8-27, and 37-38, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 2004/0012872 (Fleming et al., hereinafter referred to as Fleming) in view of U. S. Patent Application Publication 2003/0151032 (Ito et al., hereinafter referred to as Ito).

Fleming, in the abstract, in [0019], [0020], [0021], [0022], [0027], [0060], [0076], [0188], discloses a method of providing a photoreactive composition that is substantially inorganic, exposing the photoreactive composition to a multibeam exposure process (multi beam of at least four beams, and multiphoton reactive radiation, pulsed IR laser) so as to form reacted and non-reacted portions of the photoreactive composition to form a three-dimensional pattern (of exposed and unexposed areas), developing the photoreactive composition (remove reacted portions or non-reacted portions, remove exposed or unexposed areas with a solvent or chemical etching) to form a periodic pattern (interstitial void space of submicron dimensions). Fleming, in [0030], through [0042], and in [0043], discloses that the pattern can be formed by performing an exposure on single-photon photocurable materials i.e., upon exposure the single-photon photocurable materials undergo exposure via single-photon (one-photon) absorption.

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Fleming, in [0044], [0061], [0062], and [0063], discloses that selected regions of the photocurable material can be subjected to exposure to light (that has an appropriate wavelength and intensity) causing multiphoton absorption and photoreaction (photoreactive composition, upon exposure, undergoes a photoreaction). Fleming, in [0074], [0080], and [0082], discloses that the photoreactive composition can include silicone resin containing epoxy functionality and that epoxy-functional polymers include epoxy functional silicones (claims 1-3, 8, 23-27, and 38). Fleming, in [0179], discloses that the photoreactive composition is further subjected to heating, causing the facilitation of dissolution of certain components and the dissipation of volatile components and therefore losses less than 60 percent of the its initial weight (upon irradiation and heating) (claims 5, and 37). Fleming, in [0028], and [0074], discloses that the photoreactive composition includes reactive species such as curable organic species, a photoinitiator, and inorganic particles such as siloxanes (claims 4, 6). Fleming, in [0028], [0108], [0124], [0134], discloses a photoinitiator that includes a multiphoton photosensitizer, electron donors such as amines, and electron acceptors such as iodonium salts or triazines (claims 9-10, and 15-16). Fleming, in [0099], discloses that the photon absorption of the multi-photon photosensitizer is greater than that of the fluorescein (claim 11-12). Fleming, in [0110], discloses that the multi-photon photosensitizer (with a large multi-photon absorption cross-section) in the photoreactive composition is Rhodamine B (claims 13-14). Fleming, in [0134], discloses that the photoreactive composition includes metal fluorides (metal complexes such as oxides) that are later irradiated during exposure (claims 17-22).

The difference between the claims and Fleming is that Fleming does not disclose the use of a plurality of inorganic particles in the photoreactive composition.

Ito, in [0028], [0046] through [0053], [0173] through [0183], [0185], and [1068], discloses the use of plural inorganic particles in the photosensitive composition.

Therefore, it would be obvious to modify Fleming by including inorganic particles in the photoreactive composition as suggested by Ito because Ito, in [0210], through [0219], and [0663]-[0665], discloses that using inorganic particles in the composition enables improved permittivity.

3. Claims 28-35, are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 2004/0012872 (Fleming et al., hereinafter referred to as Fleming) in view of U. S. Patent Application Publication 2003/0151032 (Ito et al., hereinafter referred to as Ito) as applied to claims 1-6, 8-27, and 37-38, and further in view of U. S. Patent No. 4,406,992 (Kurtz et al., hereinafter referred to as Kurtz).

Fleming in view of Ito is discussed in paragraph no. 2.

Fleming, in [0021], [0022], [0027], [0060], [0076], [0188], discloses removing reacted or unreacted (or both) portions of the photoreactive composition after exposure processes by developing or etching (claims 30-31).

The difference between the claims and Fleming in view of Ito is that Fleming in view of Ito does not disclose that the three-dimensional structures (interstitial voids) formed are deposited with a semiconductor material as recited in claims 28, 29, 32-35).

Kurtz, in col 3, lines 55-67, and in col 4, lines 29-32, discloses that the grating structure is filled with a semiconducting material such as silicon, wherein the grating has

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a refractive index that is different than that of the semiconductor (material filling the grating or interstitial voids).

Therefore, it would be obvious to a skilled artisan to modify Fleming in view of Ito by employing the method of depositing the claimed material on the gratings as suggested by Kurtz, because Fleming, in [0002], discloses that the three-dimensional patterns (gratings) are formed using the multi-photon method, and Kurtz, in col 5, lines 59-64, in col 6, lines 1-3, discloses that using the semiconductor material to fill the grating enables the production of a semiconductor device (transducer) that is capable of high temperature operation.

Response to Arguments

4. Applicant's arguments, see Amendment, and Remarks, filed July 20, 2009, have been fully considered but they are not persuasive. Therefore, the 103 rejections made over claims 1-6,8-35, 37-38, have been maintained.

A) Applicants argue that neither Fleming nor Ito nor Kurtz teaches an MBI (multi-beam interference) exposure technique that effects a one-photon absorption and photoreaction, and that Fleming only does a comparison of single-photon absorption and two-photon photoprocesses.

Ito is not relied upon to disclose single-photon absorption. Fleming, in [0043], discloses performing the same exposure to a single-photon photocurable composition i.e., the MBI can be used to expose single-photon photoreactive composition (photodefinable composition) to cause single-photon absorption and its corresponding photoreaction. In paragraph no. [0105], Fleming teaches that the photosensitizer is

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capable of sensitizing in an irradiation wavelength that overlaps single photon absorption spectrum i.e., single photon absorption conditions. Also, Fleming, in [0207], discloses that the image to be formed (the pattern to be formed) is fixed by an exposure that induces single photon absorption. Therefore, Fleming teaches both the possibilities i.e., a multi-beam interference exposure that effects multi-photon absorption and the use of a single-photon photocurable material to cause a single-photon absorption, upon exposure. Also, the specification of the instant application does not teach only a single-photon absorption when performing an MBI exposure. In fact, applicant's specification teaches that the multi-photon photosensitizers, and/or photoinitiators are more preferred so as to obtain multi-photon absorption, upon exposure, and that multi-photon absorption are preferred over single-photon absorption.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Daborah Chacko-Davis/
Primary Examiner, Art Unit 1795

May 10, 2010.